

REMARKS/ARGUMENTS

Reconsideration and favorable action with respect to this application based on the amendment and following remarks are respectfully requested:

Amendment to the Claims

In response thereto, applicant has amended Claim 30 and canceled claim 40 in order to avoid any misunderstanding from the examiner or one skilled in the art. Therefore, the applicant presents a better and proper supported form according to the original specification and figures. However, the Figures and the specification as originally filed support all amendments of the description in Claim 30. It is respectfully submitted that these changes are clearly supported by the description of the application, and hence do not constitute new matters.

Objection of Claim 30

Claim 30 has been amended to solve the informality problem.

Rejection of Claims 30, 31, 36, 37 and 40 Under 35 U.S.C. §112, second paragraph

Claim 40 has been canceled to solve the indefinite problem.

Claim 31, 36, 37 depends from claim 30, so Claim 30 is corrected to overcome this rejection.

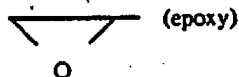
Rejection of Claims 30, 31 and 36 Under 35 U.S.C. §102 (b)

Claims 30, 31 and 36 are rejected under 35 U.S.C. §102(b) as being anticipated by SAU (US 5,071,978).

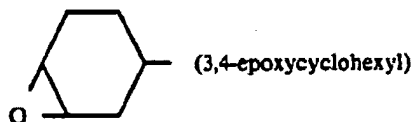
The Examiner states that SAU teaches a material having cross-linking structure that is modified substrate bounded to bridges formed by a cross-linking agent. The substrate contains chitosan (claim 10) and the cross-linking agent is formed from the following X groups (see e.g. col. 2 line 26 to col.3 line 5), specially:

i) Cl, Br, I.

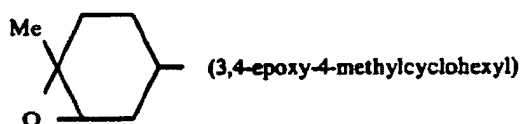
ii) —N=C=O (isocyanate)



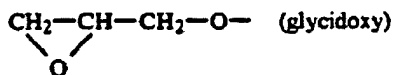
iii)



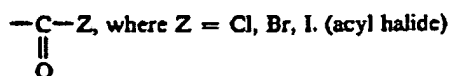
iv)



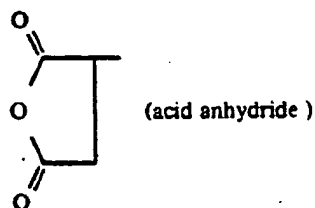
v)



vi)



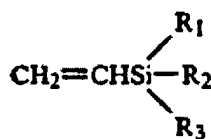
vii)



viii)



The agent further comprises a silicon (Z group in instant claim 30) that is attached to R1, R2, R3 (Y groups in instant claim 30). See e.g. the formula at col. 2 line 21 and the formula at col. 3 line 10). An example of the full cross-linking agent in the reference is given as the following:

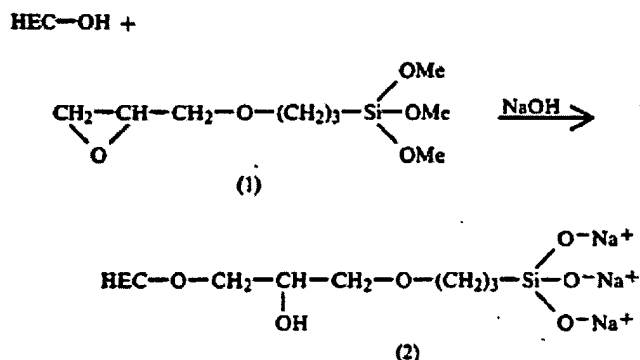


Where R1, R2 and R3 are alkoxy. See col. 2 lines 31-34 and col. 3 line 10. This anticipates the instant invention where X is: H₂C=CH-, Z is Si, and Y₃ is: an alkoxy (i.e. alkoxide). Furthermore, the alkoxy can be hydrolyzed (see e.g. col. 3 lines 34-38) there by creating a “dehydrating-combination reaction” when self-cross-linking or combining (see e.g. col. 4 lines 10-13); instant claim 31. The cross-linking agent further comprises GPTMS (see e.g. col. 3 lines 14-18 and claim 5); instant claim 36.

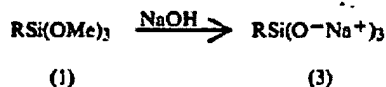
This rejection is respectfully traversed on the basis that SAU teaches away from the present invention. SAU discloses sited polysaccharides and method for preparation involves: (1) reaction in a **caustic medium**; (2) recovering a neutralized sited polysaccharide; and (3) washing to remove impurities. The preferred polysaccharide is cellulose ether (Abstract).

SAU discloses “It has been found that hydroxyethylcellulose (HEC)

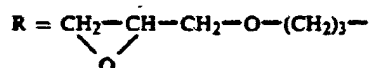
reacts with (3-glycidoxypropyl)trimethoxysilane (GPTMS) in the presence of **caustic** to form the siled HEC (SIL-HEC) according to the following reaction scheme.



The formation of the anionically substituted HEC (2) from the reaction of HEC with the nonionic organosilane (1) is due to the hydrolysis of $\equiv \text{Si}(\text{OMe})$ groups of the latter under the alkaline conditions used to etherify the HEC. That is, (1) is converted to the sodium silanolate (3).



where



The sodium silanolate species (3), generated in situ, reacts with HEC to form the siled derivative (2).” (col. 3 lines 15-52)

SAU also discloses “...**SIL-HEC exhibits** good dispersibility in water and dissolves rapidly to form clear solutions having a **pH of 10-12**. The sodium silanolate function, $--\text{Si}(\text{O}^-\text{Na}^+)$, is basic and accounts for the high solution pH...”(col. 3 lines 63-67)

However, “The preparation of **chitosan** is usually designed to

ensure a product completely **soluble in dilute hydrochloric acid or orsanic acid but insoluble in neutral or alkaline aqueous solvent**. Chitosan is also soluble in dilute nitric acid, marginally soluble in 0.5% H_3PO_4 , and insoluble in sulphuric acid at any concentration at room temperature. Chitosan is not soluble in any common organic solvent (eg., dimethylformamide and dimethyl sulfoxide), but it dissolves well in acidified polyols. The best solvent for chitosan was found to be formic acid, where solutions are obtained in aqueous systems containing 0.2 to 100% of formic acid (Kienzle-Sterzer et al, 1982).” (Nellie Gagné, Production of chitin and chitosan from crustacean waste and their use as a food processing aid, July 1993. p.10)

Furthermore, here is a quotation of Sun-Ok Fernandez-Kim **“...Above pH 7.0 chitosan solubility’s stability is poor. At higher pH, precipitation or gelation tends to occur** and the chitosan solution forms poly-ion complex with anionic hydrocolloid resulting in the gel formation (Kurita, 1998).” (Sun-Ok Fernandez-Kim, physicochemical and functional properties of crawfish chitosan as affected by different processing protocols, Dec 2004. p.12)

Similarly, here is a quotation of A. Chenite, “...While chitin is completely insoluble in aqueous media, chitosan can be dissolved under acidic conditions that provide sufficient protonation of its amino groups. The resulting aqueous solutions are usually stable as long as the pH is below 6.2. **Neutralisation of chitosan solutions by common alkali solutions then leads systematically to the formation of a hydrated gel-like precipitate when the pH exceeds approximately 6.2...**”(A. Chenite et al., Monolithic gelation of chitosan solutions via enzymatic hydrolysis of urea, Carbohydrate Polymers 64 (2006) 419–424)

According to the foregoing description, one skilled in the art, taught by SAU, will modify chitosan with organosilane (e.g. GPTMS) in **caustic medium**, then obtained **chitosan precipitation or chitosan gel without cross-linking structure**. SAU's method is only workable for polysaccharide which is soluble in neutral or alkaline aqueous solvent. Therefore, it is not obvious for one skilled in the art to achieve the feature of the present invention from SAU's teaching.

For the reasons set forth above, Applicant respectfully submits that Independent claim 30 is allowable. Claims 31, 36, 37 depend from claim 30, so claims 31, 36, 37 are allowable for at least the reasons cited above regarding claim 30.

With the submission of this Response, the subject Patent Application has been placed in condition for allowance, and such action is respectively requested.

Respectfully submitted,
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